Instructions to the Students:

- This a closed book, closed notes exam
- Answer all questions
- Be clear and precise in your work. Check your answers before turning them in.
- Switch off your mobile phone, keep it away and never use it during the exam
- Ask the instructor for work sheets in case you need to use them for rough work. Attach them if necessary.
- Put your name and student ID on each of the worksheets you attach.

Question	Points	Max. Points
Q1	17	20
Q2	4.5	5
Q3	5	5
Q4	10	10
Q5	10	10
TOTAL	46.5	**50**

Question 1: **In the following questions, find the correct choice of the given choices.** ***Circle your choices in the provided table*** *(20 marks)*

1. Which of the following can occur when there is redundant data stored in the database?
   a. It is impossible to uniquely identify a record.
   b. Updates or changes can result in inconsistent data.
   c. Linking tables cannot be created.
   (d.) all of the above

2. A(n) _____ contains the changes that have been made to the database.
   a. rollback log
   (b.) transaction log
   c. server process
   d. application server

3. Which of the following is normally used to generate a surrogate key in Oracle10*g*?
   (a.) sequences
   b. key fields
   c. candidate keys
   d. the normalization process1

4. Which of the following is *not* correct in regard to a primary key?
   a. A primary key cannot be NULL.
   (b.) A primary key must appear as a foreign key in another table.
   c. The value assigned to a primary key must be unique for each record.
   d. None. All of the above are correct statements.

5. Which of the following can occur when there is redundant data stored in the database?
   a. It is impossible to uniquely identify a record.
   b. Updates or changes can result in inconsistent data.
   c. Linking tables cannot be created.
   (d.) all of the above

6. Which of the following is normally used to generate a surrogate key in Oracle10*g*?
   (a.) sequences
   b. key fields
   c. candidate keys
   d. the normalization process

7. Which of the following constraints permit NULL values?
   (a.) Unique
   b. primary key
   c. NOT NULL
   d. none of the above

8. When you create an object, it is stored in your _____.
   a. user table
   (b.) user schema
   c. data dictionary
   d. object list

9. Which of the following declares that the column can store a total of five digits, two of which are decimal values?
   a. NUMBER(3,2)
   (b.) NUMBER(5,2)
   c. NUMBER(float)
   d. NUMBER(p, 2)

10. Which of the following constraints must be included or the table cannot be created in Oracle10*g*?
    a. primary key
    b. foreign key
    c. NOT NULL
    d. none of the above

11. Which of the following commands should be used to change the name of a column?
    a. RENAME
    b. ALTER TABLE
    c. MODIFY TABLE
    d. CHANGE

12. When modifying a database table, which of the following is a restricted action?
    a. deleting a constraint
    b. increasing the maximum size value of a field
    c. adding a new field
    d. deleting a table

13. Which of the following commands is used to discard any uncommitted changes?
    a. ROLLBACK
    b. COMMIT
    c. DELETE
    d. UNDO

14. Which of the following SQL commands cannot be rolled back after it is executed?
    a. TRUNCATE
    b. DELETE
    c. INSERT
    d. UPDATE

15. Which of the following is a valid statement?
    a. You cannot truncate or drop a table that contains a constraint.
    b. You cannot drop a table that contains a foreign key constraint.
    c. You cannot drop a table that is being referenced by a foreign key constraint.
    d. all of the above

16. Which of the following is a valid statement?
    a. The CREATE SEQUENCE command is a DML, so the user must execute a COMMIT command before the sequence is permanently updated to the database.
    b. The CREATE SEQUENCE command is a DDL, so the user must execute a COMMIT command before the sequence is permanently updated to the database.
    c. The CREATE SEQUENCE command is a DML, so the sequence is permanently updated to the database when the command is executed.
    d. The CREATE SEQUENCE command is a DDL, so the sequence is permanently updated to the database when the command is executed.

17. Which keyword is used to retrieve the computer's current date and time?
    a. DATE
    b. SYSTEMTIME
    c. TIME
    d. none of the above

18. A(n) _____ requires the use of a table alias to mimic the referencing of two different tables, when in reality, they are the same table.
    a. outer-join
    b. inner-join
    c. equi-join
    d. self-join

19. You write a SELECT statement with two join conditions. What is the maximum number of tables you have joined together without generating a Cartesian product?

a. 0
b. 4
c. 2
d. 3

20. Could the two statements return different values?

```
Select count(s_id) From student; And Select count(*)From student;
```

a. Always the same value returned
b. First value > second value
c. Second value > first value
d. Always different values

M/C ANSWERS

1	a	b	c	d
2	a	b	c	d
3	a	b	c	d
4	a	b	c	d
5	a	b	c	d
6	a	b	c	d
7	a	b	c	d
8	a	b	c	d
9	a	b	c	d
10	a	b	c	d
11	a	b	c	d
12	a	b	c	d
13	a	b	c	d
14	a	b	c	d
15	a	b	c	d
16	a	b	c	d
17	a	b	c	d
18	a	b	c	d
19	a	b	c	d
20	a	b	c	d

17

Question 2:

Consider the following instances over the schema given below which represents a database of sailors, boats, and reservation activity of sailors reserving certain boats on certain dates. *(5 marks)*

Sailors(SID, SNAME, RATING, AGE)
Boats(BID, BNAME, COLOR)
RESERVES(SID, BID, DAY)

Sailors

SID	SNAME	RATING	AGE
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horashio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

Boats

BID	BNAME	COLOR
101	Interlake	BLU
102	Interlake	RED
103	Clipper	GRN
104	Marine	RED

Reserves

SID	BID	DAY
22	101	10/10/1998
22	102	10/10/1998
22	103	10/8/1998
22	104	10/7/1998
31	102	11/10/1998
31	103	11/6/1998
31	104	11/12/1998
64	101	9/5/1998
64	102	9/8/1998
74	103	9/8/1998

Suppose that the following SQL DDL commands were used to create the Sailors and Boats tables:

```
create table Sailors(
        sid         number(2),
        sname       varchar2(20) constraint sailors_sname_pk primary key,
        rating      number(2),
        age         number(4,1));

create table Boats(
        bid         number(3) constraint boat_bid_pk primary key,
        bname       varchar2(20),
        color       varchar2(20));
```

1. Without re-creating the tables, write the required SQL statements so that **SID** becomes the primary key of the **Sailors** table. Give it a proper descriptive constraint name.

0.5

```
Alter table Sailors
drop constraint Sailors_Sname_pk ;
Alter table Sailors
add constraint Sailors_Sid_pk primary key ;
```

2. Add a new constraint on the column COLOR of the Boats table such that the possible values for this field are: BLU (for blue), RED (for read), GRN (for green), and WHT (for white). Give it an appropriate descriptive name.

1

```
Alter table Boats
add constraint check ((color = 'BLU') OR (color = 'RED') OR (color = 'GRN')
OR (color = 'WHT')) (color)
```

3. Write SQL statement to create the **Reserves** table taking into consideration the PRIMARY and FOREIGN KEY constraints. Let DAY value be not null and it defaults to the system date at the time of record insertion.

```
Create table Reserves (
 Sid number(2) constraint Sailors_sid_fk FOREIGN KEY refrences Sailors(Sid),
 Bid number(3),
Day DATE Not NULL
 Constraint Reserves_Sid_Bid_day_PK Primary key (Sid, Bid, day),
 Constraint Reserves_day_df DEFAULTS = sysDate);
```

4. Add a new column to the table Reserves. Call it DURATION which records the expected time the sailor expects to reserves the boat for (the maximum time allowed for a boat reservation is 21 Days).

```
Alter Table Reserves
add duration INTERVAL DAY TO SECOND;

Alter Table Reserves
add constraints Reserves_time_check CHECK (duration < 22);
```

2K

5. Create a view called RATING_AGE that displays the average age for each sailor rating.

RATING	AVG(AGE)
1	33
8	40.5
7	40
3	44.5
10	25.5
9	35

```
Create view RATING_AGE as ( Select AVG(Age), rating
                            from Sailors
                            Group By Rating;
                          )
```

Question 3:

Show the result of the following queries based on the instances of the tables given above. *(5 marks)*

1. Query 1:

```
SELECT S.SNAME, S.SID
FROM   SAILORS S, RESERVES R
WHERE  S.SID = R.SID
GROUP BY S.SNAME, S.SID
HAVING COUNT(*) >= 3;
```

Dustin 22
Lubber 31

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2. Query 2:

```
SELECT S.SNAME
FROM   SAILORS S, RESERVES R, BOATS B
WHERE  S.SID=R.SID AND R.BID=B.BID AND B.COLOR='RED'
MINUS
SELECT S2.SNAME
FROM   SAILORS S2, BOATS B2, RESERVES R2
WHERE  S2.SID=R2.SID AND R2.BID=B2.BID AND B2.COLOR='GREEN';
```

Dustin
Lubber
Horatio

---

3. Query 3:

```
SELECT S.SNAME
FROM   SAILORS S
WHERE  S.AGE > ( SELECT MAX(S2.AGE)
                 FROM   SAILORS S2
                 WHERE  S2.RATING = 10 );
```

35

Dustin
Lubber
Bob

---

4. Query 4:

```
SELECT SAILORS.SID, BID, DAY
FROM   SAILORS, RESERVES
WHERE  RESERVES.SID (+) = SAILORS.SID;
```

has null

Sailors.SID	BID	Day
22	101	10/10/1998
22	102	10/10/1998
22	103	10/8/1998
22	104	10/7/1998
29	NULL	NULL
31	102	11/10/1998
31	103	11/6/1998
31	104	11/12/1998
32	NULL	NULL

---

5. Query 5:

```
SELECT S.SNAME
FROM   SAILORS S
WHERE  S.SID NOT IN ( SELECT R.SID
                      FROM   RESERVES R
                      WHERE  R.BID = 103);
```

22 31 74

Brutus
Andy
Rusty
Horatio
Zorbo
Art
Bob

Question 4:

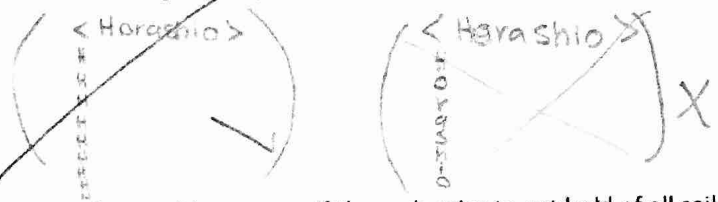
Consider the above **Sailors** table given in question2 and the following PL/SQL code: *(10 marks)*

```
Declare
        v_sname          sailors.sname%TYPE;
        v_age            sailors.age%TYPE;
        v_rating         sailors.rating%TYPE;
        i                integer;
BEGIN
        SELECT sname, age, rating
        INTO v_sname, v_age, v_rating
        FROM sailors
        WHERE rating =9;

        DBMS_OUTPUT.PUT_LINE('<' || v_sname || '>');

        for i in 1..v_rating
        loop
                DBMS_OUTPUT.PUT_LINE(substr(v_sname,1,1));
        end loop;
end;
```

1. According to the provided data given above, what is the output of this PL/SQL code?



3

2. What could go wrong if the code tries to get hold of all sailors with a rating >=9.

There will be an error, cursors must be used for that (when retrieving more than one raw)

3

3. Re-write the code so that you avoid the problems that might arise from running the code given below.

```
Declare
        Cursor  Sailors_Cursor  as
        ( Select sname, age, rating
          from Sailors
          where rating >= 9 ) ;
        Sailors_row     Sailors_cursor%rowtype ;
        i   integer ;
BEGIN
        FOR  Sailors_cursor  IN  Sailors_Row  LOOP

        DBMS_OUTPUT.PUT_LINE ('<' || Sailors_row.sname || '>') ;
        For  i  IN  1 .. Sailors.rating
        loop
            DBMS_Output.Put_LINE ( Substr (Sailors_row.Sname , 1,1)) ;
        end loop

END ;
```

4

Question 5:

Write a PL/SQL block that displays for each sailor: SID, Name and a list of boat reservations. A sample output (that might be different from what you'll get) is shown below. *(10 marks)*

```
22 Dustin's Reservations:
>           101 on 10-OCT-98
>           102 on 10-OCT-98
>           103 on 08-OCT-98
>           104 on 07-OCT-98

 29 Brutus's Reservations:

 31 Lubber's Reservations:

 >           102 on 10-NOV-98
 >           103 on 06-NOV-98
 >           104 on 12-NOV-98

 32 Andy's Reservations:

 58 Rusty's Reservations:

 64 Horataio's Reservations:
 >           101 on 05-SEP-98
 >           102 on 08-SEP-98
 71 Zorba's Reservations:
 74 Horashio's Reservations:
 >           103 on 08-SEP-98

 85 Art's Reservations:

 95 Bob's Reservations:
```


```
Declare
  create cursor sres_cursor( select SID, SName, To_Date(DAY, 'DD-MM-YY'),
                             count(BID) as counter
                             from Sailors, Reservations
                             where Sailors.sid = Reservation.Sid
                             group By SID)

  sres_row        sres_cursor%RowType

BEGIN
  For sres_cursor IN sres_row loop
DBMS_OUTPUT.Put_line (sres_row.SID || ' ' || sres_row.SName
  || ' ''s' || ' Reservations: ');
  for i in 1.. counter
  loop
    DBMS_OUTPUT.PUT_line (DAY);
  end loop

END;
```